

What is claimed is:

1. A method of combustion, comprising:
supplying a premixed fuel through at least one nozzle into a combustion chamber, the premixed fuel comprising an oxidizer;
supplying a non-premixed fuel through at least one nozzle into the combustion chamber; and
simultaneously burning the premixed and non-premixed fuel in the combustion chamber.
2. The method of Claim 1, wherein the non-premixed fuel comprises an oxidizer in an amount substantially smaller than that is needed to completely oxidize a total amount of a combustible material contained therein.
3. The method of Claim 1, wherein the premixed fuel is a mixture comprising an oxidizer and at least one combustible material.
4. The method of Claim 3, wherein the non-premixed fuel comprises the at least one combustible material.
5. The method of Claim 1, further comprising supplying an oxidizer substantially free of a combustible material through at least one nozzle into the chamber.
6. The method of Claim 1, wherein the non-premixed fuel is supplied into the combustion chamber through a plurality of nozzles.
7. The method of Claim 1, wherein the premixed fuel is supplied into the chamber through a plurality of nozzles, which are arranged such that the plurality of the nozzles as a whole substantially surround the at least one nozzle for supplying the non-premixed fuel.
8. The method of Claim 7, wherein at least a portion of the plurality of nozzles for supplying the premixed fuel is separated from the at least one nozzle for supplying the non-premixed fuel by substantially the same distance.
9. The method of Claim 7, wherein at least a portion of the plurality of nozzles for supplying the premixed fuel is located on an imaginary circle surrounding the at least one nozzle for supplying the non-premixed fuel.
10. The method of Claim 9, wherein the at least one nozzle for supplying the non-premixed fuel is located on or near the center of the imaginary circle.

11. The method of Claim 9, wherein each of the nozzles on the imaginary circle is spaced apart from neighboring nozzles on the imaginary circle by substantially the same distance.

12. The method of Claim 11, wherein each of the nozzles for supplying the premixed fuel has a substantially circular opening with a diameter configured to inject the premixed fuel into the chamber, and wherein a ratio of the distance between neighboring nozzles to the diameter is from about 3 to about 28.

13. The method of Claim 12, wherein the ratio is from about 15 to about 25.

14. The method of Claim 1, wherein a ratio of an amount of the non-premixed fuel to an amount of the premixed fuel is from about 0.001 to about 0.1.

15. The method of Claim 1, wherein the at least one nozzle for the premixed fuel and the at least one nozzle for the non-premixed fuel are formed in a single piece fuel injector.

16. The method of Claim 15, wherein the method further supplies the premixed fuel and non-premixed fuel using a plurality of the single piece fuel injectors, each of which comprises the at least one premixed fuel nozzle and the at least one non-premixed fuel nozzle.

17. A burner, comprising:

a combustion chamber;

at least one premixed fuel nozzle configured to supply a premixed fuel into the chamber;

at least one non-premixed fuel nozzle configured to supply a non-premixed fuel into the chamber;

at least one premixed fuel pipe connecting the at least one premixed fuel nozzle with a premixed fuel source;

at least one non-premixed fuel pipe connecting the at least one non-premixed fuel nozzle with a non-premixed fuel source; and

a controller to control operation of the burner, wherein the controller is configured to operate the burner in one or more modes, in which the premixed fuel is supplied to the chamber through the at least one premixed fuel nozzle and the non-premixed fuel is supplied to the chamber through the at least one non-premixed fuel nozzle.

18. The burner of Claim 17, further comprising a mixer configured to mix an oxidizer with the non-premixed fuel from the non-premixed source to produce the premixed fuel, wherein the mixer is the premixed fuel source.

19. The burner of Claim 17, wherein the burner comprises a plurality of premixed fuel nozzles, and wherein the plurality of premixed fuel nozzles are arranged so as to surround the at least one non-premixed fuel nozzle.

20. The burner of Claim 19, wherein at least a portion of the plurality of premixed fuel nozzles is located on an imaginary circle surrounding the at least one non-premixed fuel nozzle.

21. The burner of Claim 20, wherein the at least one non-premixed fuel nozzle is located on or near the center of the imaginary circle.

22. The burner of Claim 20, wherein each of the nozzles on the imaginary circle is spaced apart from neighboring nozzles on the imaginary circle by substantially the same distance.

23. The burner of Claim 22, wherein each premixed fuel nozzle has a substantially circular opening with a diameter configured to inject the premixed fuel into the chamber, and wherein a ratio of the distance between neighboring nozzles to the diameter is from about 3 to about 28.

24. The burner of Claim 23, wherein the ratio is from about 15 to about 25.

25. The burner of Claim 17, wherein the at least one non-premixed fuel nozzle and the at least one premixed fuel nozzle are configured to inject the non-premixed fuel and the premixed fuel at a ratio of an amount of the non-premixed fuel to an amount of the premixed fuel ranging from about 0.01 to about 0.1.

26. The burner of Claim 17, wherein the at least one premixed fuel nozzle and the at least one non-premixed fuel nozzle are formed in a single piece fuel injector.

27. The burner of Claim 26, wherein the burner comprises a plurality of the single piece fuel injectors, each of which comprises the at least one premixed fuel nozzle and the at least one non-premixed fuel nozzle.